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Subject: 2003 Aerial Defoliation and Storm Sketchmapping Survey

To: Susan L. Stout, Research Project Leader
Warren Forestry Sciences Laboratory

On August 7 and 13, 2003, Richard Turcotte and Mark Shaver of Forest Health Protection (FHP), Morgantown, along with Lauren Miles, David Cotterman, and Don Scronek, of the Allegheny National Forest conducted an aerial sketchmapping survey of the National Forest including the Kane Experimental Forest. The accompanying maps show the general locations and types of damage observed during these flights.

Summary

An extensive windstorm event on July 21st caused 341 acres of scattered blowdown and branch breakage within the experimental forest. Widespread mortality (both present and past) and discoloration of American beech were mapped on 737 acres.

21 July Storm Event

Meteorological Details of the July 21 Storm Event

The National Weather Service in State College, Pennsylvania, labeled this a devastating severe weather event that was one of the more unique weather systems to affect the area in many years. The Monday afternoon storm featured severe thunderstorms, downbursts, and an F1 tornado (73 mph to 112 mph).

A series of thunderstorms moved across western and northern Pennsylvania during the evening hours of July 20th and morning hours of 21 July 2003. A mesoscale convective vortex (MCV) moving out of Ohio initiated thunderstorms from eastern Ohio to the Atlantic coast as it moved northeastward. The MCV and the boundaries left behind from earlier thunderstorms likely contributed to the large number of reports of severe weather, including several tornadoes in the region.

A series of favorable conditions came together to produce the severe weather event of 21 July 2003. Of significance was the large-scale vortex, which appeared to be an MCV. This intense system triggered convection and produced a series of spiral-like bands, which moved around the system from the east, as the entire MCV moved to the north and east. Intense smaller-scale vortices developed along the feeder-like band. The tornadic activity appeared linked to these intense smaller vortices along the bands. The large number of damaging wind reports suggests that in addition to these intense vortices, which produced downbursts [a strong wind gust on or near the ground which is generated by a thunderstorm], macrobursts [a downburst that produces a swath of damage 2.5 miles or greater in width], microbursts [a downburst that produces a swath of damage 2.5 miles or less in width], and tornadoes, distinct bow echoes developed along these bands. The bow echoes contributed to the total number of reports and the overall widespread nature of the reported severe weather throughout Pennsylvania[1].

[1] Grumm, R.H. The Mesoscale Convective Vortex Severe Weather Event of 21 July 2003, DET-2 401st AEW, Kosovo

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Classification of Damage

Storm damage was classified as blowdown, breakage, or both. Two severity classes were used to classify visual estimates of storm damage in mapped polygons (Table 1). The damage pattern was classified as scattered or continuous.

Table 1. Severity classes used for classification of storm damage for the 21 July 2003 storm on the Allegheny National Forest and intermingled State and private lands.

Light	Equal to or less than 50% affected*
Heavy	More than 50% affected*

*Estimated percentage of trees showing branch or bole breakage and blow down

Results

An aerial survey identified 341 acres of windstorm-related damage within the boundary of the Kane Experimental Forest. Areas of damage were scattered throughout the experimental forest. Wind damage did not follow any pattern and was not confined to any specific area, aspect, or slope.

Widespread past and present American beech mortality and discoloration were mapped on 737 acres. Ground truthing of these areas revealed that a complex of agents caused this mortality, including classic beech bark disease (BBD). Other factors, such as drought, defoliation, frost, and ambrosial beetles, have also played a role. Classic BBD is caused by a combination of native fungi and an introduced insect. BBD results from the interaction between the introduced beech scale insect *Cryptococcus fagisuga* Lind. and the fungus *Nectria coccinea var. faginata* Lohman or *N. galligena* Bres. This complex can cause significant bole cankering and mortality in American beech, *Fagus grandifolia* (Ehrh.).

Recommendations

Aerial surveys provide general information on the location, pattern, and estimated level of damage and should be used as a starting point for more intensive damage assessment surveys using road surveys, aerial photography, forest plots or transects, and standard measurements. Follow-up activities include:

- Conducting road surveys of an area when possible, using standardized methods, and continuing to update and refine damage maps.
- Randomly sampling the forest so that quantitative results can be expressed as a proportion of the total forest rather than being based on extremes of specific segments of the forest.
- Quantifying the species and size classes of trees damaged.
- Quantifying damage based on type of damage (tree down, bole broken, crown damage, top broken, etc.).
- Comparing the damage to mortality rates from previous storms.

We ask that all field personnel continue to monitor for evidence of defoliation, disease, and wind damage on the Kane Experimental Forest and report this information to the Morgantown Field Office as a ground check to the aerial survey polygons.

If you or any of your staff have any questions or comments regarding this survey, please contact Richard Turcotte at (304) 285-1544.

Sincerely,

JOHN W. HAZEL
Field Representative
Morgantown Field Office
BM/RMT